

Appl. No. 09/995,004
Reply to Final OA Dated September 23, 2005

LISTING OF THE CLAIMS

Claims 1-78 are pending. No claims are amended, canceled, or withdrawn.

The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Original) In a distributed computing environment, a method for dynamically implementing workflow responsive to a directory object state change, the method comprising:

detecting a state change to an object in a directory; and

responsive to detecting the state change:

mapping the state change to the object to a workflow comprising a set of tasks; and

executing the tasks to achieve a desired state in the directory.

2. (Original) A method as recited in claim 1, wherein executing the tasks further comprises storing the desired state.

3. (Original) A method as recited in claim 1, wherein executing the tasks further comprises continuously executing an operation of a task of the tasks until convergence of the desired state is identified.

4. (Original) A method as recited in claim 1, wherein executing the tasks further comprises storing a sequence of operations based on the tasks.

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1 5. (Original) A method as recited in claim 1, wherein executing the
2 tasks further comprises storing information corresponding to one or more directory
3 objects to which the workflow applies.

4
5 6. (Original) A method as recited in claim 1, wherein executing the
6 tasks further comprises storing status information based on respective status of at
7 least one subset of the tasks.

8
9 7. (Original) A method as recited in claim 1, wherein mapping the state
10 change to the object further comprises evaluating the state change to the object
11 based on a declarative condition stored as a text string on an object instance of a
12 content class defined by the directory schema.

13
14 8. (Original) A method as recited in claim 1, wherein a task of the tasks
15 comprises any combination of a declarative condition or an operation that is stored
16 as a text string on an object instance of a content class defined by the directory
17 schema.

18
19 9. (Original) A method as recited in claim 1, wherein semantics of the
20 workflow are based on a workflow schema.

21
22 10. (Original) A method as recited in claim 1, wherein mapping the state
23 change to the object, semantics of the mapping are based on an event association
24 object schema.

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11. (Original) A method as recited in claim 1, wherein executing the tasks at least one subset of the tasks are executed with respect to one another based on an order of execution relationship comprising a finish-start relationship, a parallel execution relationship, a precedence constraint relationship, or a task priority relationship.

12. (Original) A method as recited in claim 1, wherein executing the tasks at least one subset of the tasks is executed with respect to one another based on a precedence constraint relationship or a task priority relationship.

13. (Original) A method as recited in claim 1, wherein the method further comprises:

monitoring a status corresponding to a task of the tasks;

storing the status on a status monitoring object; and

wherein a content class in the directory schema defines the status-monitoring object.

14. (Original) A method as recited in claim 1, wherein the method further comprises:

monitoring a set of directory resources affected by the workflow;

storing the directory resources on a status monitoring object; and

wherein a content class in the directory schema defines the status-monitoring object.

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15. (Original) A method as recited in claim 1, wherein the method further comprises:

monitoring a status corresponding to an operation of the workflow;

determining that the status comprises a failure status;

responsive to the determining, taking a corrective action to advance the workflow in view of the failure status; and

wherein a content class in the directory schema defines the status-monitoring object.

16. (Original) A method as recited in claim 1, wherein executing the tasks further comprises:

updating a status corresponding to a task in the workflow; and

responsive to the updating, evaluating the workflow to determine that a next task of the tasks to be implemented.

17. (Original) A method as recited in claim 1, wherein the tasks represent an inverse set of tasks that were previously performed as part of a different workflow.

18. (Original) A method as recited in claim 1, wherein the tasks implement a policy with respect to one or more directory resources, and wherein mapping the state change to the object further comprises automatically determining the workflow based on the policy.

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19. (Original) A computer-readable medium comprising computer-executable instructions for dynamically implementing workflow responsive to a directory object state change, the computer-executable instructions comprising instructions for:

detecting a state change to an object in a directory; and

responsive to detecting the state change:

mapping the state change to the object to a workflow comprising a set of tasks; and

executing the tasks to achieve a desired state in the directory.

20. (Original) A computer-readable medium as recited in claim 19, wherein the instructions for executing the tasks further comprise instructions for storing the desired state.

21. (Original) A computer-readable medium as recited in claim 19, wherein the instructions for executing the tasks further comprise instructions for continuously executing an operation of a task of the tasks until convergence of the desired state is identified.

22. (Original) A computer-readable medium as recited in claim 19, wherein the instructions for executing the tasks further comprise instructions for storing a sequence of operations based on the tasks.

23. (Original) A computer-readable medium as recited in claim 19, wherein instructions for executing the tasks further comprise instructions for

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1 storing information corresponding to one or more directory objects to which the
2 workflow applies.

3
4 24. (Original) A computer-readable medium as recited in claim 19,
5 wherein the instructions for executing the tasks further comprise instructions for
6 storing status information based on respective status of at least one subset of the
7 tasks.

8
9 25. (Original) A computer-readable medium as recited in claim 19,
10 wherein the instructions for mapping the state change to the object further
11 comprise instructions for evaluating the state change to the object based on a
12 declarative condition stored as a text string on an object instance of a content class
13 defined by the directory schema.

14
15 26. (Original) A computer-readable medium as recited in claim 19,
16 wherein a task of the tasks comprises any combination of declarative conditions
17 and operations that are stored as a text string on an object instance of a content
18 class defined by the directory schema.

19
20 27. (Original) A computer-readable medium as recited in claim 19,
21 wherein semantics of the workflow are based on a workflow schema.

22
23 28. (Original) A computer-readable medium as recited in claim 19,
24 wherein the instructions for mapping the state change to the object, semantics of
25 the mapping are based on an event association object schema.

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1
2 29. (Original) A computer-readable medium as recited in claim 19,
3 wherein the instructions for executing the tasks, at least one subset of the tasks are
4 executed with respect to one another based on an order of execution relationship
5 comprising a finish-start relationship, a parallel execution relationship, a
6 precedence constraint relationship, or a task priority relationship.

7
8 30. (Original) A computer-readable medium as recited in claim 19,
9 wherein the instructions for executing the tasks, at least one subset of the tasks are
10 executed with respect to one another based on a precedence constraint relationship
11 or a task priority relationship.

12
13 31. (Original) A computer-readable medium as recited in claim 19,
14 wherein the computer-executable instructions further comprise instructions for:
15 monitoring a status corresponding to a task of the tasks;
16 storing the status on a status monitoring object; and
17 wherein a content class in the directory schema defines the status-
18 monitoring object.

19
20 32. (Original) A computer-readable medium as recited in claim 19,
21 wherein the computer-executable instructions further comprise instructions for:
22 monitoring a set of directory resources affected by the workflow;
23 storing the directory resources on a status monitoring object; and
24 wherein a content class in the directory schema defines the status-
25 monitoring object.

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1
2 33. (Original) A computer-readable medium as recited in claim 19,
3 wherein the computer-executable instructions further comprises instructions for:
4 monitoring a status corresponding to an operation of the workflow;
5 determining that the status comprises a failure status;
6 responsive to the determining, taking a corrective action to advance the
7 workflow in view of the failure status; and

8 wherein a content class in the directory schema defines the status-
9 monitoring object.
10

11 34. (Original) A computer-readable medium as recited in claim 19,
12 wherein the instructions for executing the tasks further comprise instructions for:
13 updating a status corresponding to a task in the workflow; and
14 responsive to the updating, evaluating the workflow to determine that a
15 next task of the tasks to be implemented.
16

17 35. (Original) A computer-readable medium as recited in claim 19,
18 wherein the tasks represent an inverse set of tasks that were previously performed
19 as part of a different workflow.
20

21 36. (Original) A computer-readable medium as recited in claim 19,
22 wherein the tasks implement a policy with respect to one or more directory
23 resources, and wherein the instructions for mapping the state change to the object
24 further comprises instructions for automatically determining the workflow based
25 on the policy.

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1
2 37. (Original) A computing device comprising:
3 a memory comprising computer-executable instructions for dynamically
4 implementing workflow responsive to a directory object state change; and
5 a processor coupled to the memory for executing the computer-executable
6 instructions, the computer-executable instructions comprising instructions for:
7 detecting a state change to an object in a directory; and
8 responsive to detecting the state change:
9 mapping the state change to the object to a workflow comprising a set of
10 tasks; and
11 executing the tasks to achieve a desired state in the directory.

12
13 38. (Original) A computing device as recited in claim 37, wherein the
14 instructions for executing the tasks further comprise instructions for storing the
15 desired state.

16
17 39. (Original) A computing device as recited in claim 37, wherein the
18 instructions for executing the tasks further comprise instructions for continuously
19 executing an operation of a task of the tasks until convergence of the desired state
20 is identified.

21
22 40. (Original) A computing device as recited in claim 37, wherein the
23 instructions for executing the tasks further comprise instructions for storing a
24 sequence of operations based on the tasks.
25

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1 41. (Original) A computing device as recited in claim 37, wherein
2 instructions for executing the tasks further comprise instructions for storing
3 information corresponding to one or more directory objects to which the workflow
4 applies.

5
6 42. (Original) A computing device as recited in claim 37, wherein the
7 instructions for executing the tasks further comprise instructions for storing status
8 information based on respective status of at least one subset of the tasks.

9
10 43. (Original) A computing device as recited in claim 37, wherein the
11 instructions for mapping the state change to the object further comprise
12 instructions for evaluating the state change to the object based on a declarative
13 condition stored as a text string on an object instance of a content class defined by
14 the directory schema.

15
16 44. (Original) A computing device as recited in claim 37, wherein a task
17 of the tasks comprises any combination of one or more declarative conditions and
18 one or more operations represented by a text string stored on an object instance of
19 a content class defined by the directory schema.

20
21 45. (Original) A computing device as recited in claim 37, wherein
22 semantics of the workflow are based on a workflow schema.
23
24
25

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1 46. (Original) A computing device as recited in claim 37, wherein the
2 instructions for mapping the state change to the object, semantics of the mapping
3 are based on an event association object schema.

4
5 47. (Original) A computing device as recited in claim 37, wherein the
6 instructions for executing the tasks, at least one subset of the tasks are executed
7 with respect to one another based on an order of execution relationship comprising
8 a finish-start relationship, a parallel execution relationship, a precedence constraint
9 relationship, or a task priority relationship.

10
11 48. (Original) A computing device as recited in claim 37, wherein the
12 instructions for executing the tasks, at least one subset of the tasks are executed
13 with respect to one another based on a precedence constraint relationship or a task
14 priority relationship.

15
16 49. (Original) A computing device as recited in claim 37, wherein the
17 computer-executable instructions further comprise instructions for:
18 monitoring a status corresponding to a task of the tasks;
19 storing the status on a status monitoring object; and
20 wherein a content class in the directory schema defines the status-
21 monitoring object.

22
23 50. (Original) A computing device as recited in claim 37, wherein the
24 computer-executable instructions further comprise instructions for:
25 monitoring a set of directory resources affected by the workflow;

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1 storing the directory resources on a status monitoring object; and
2 wherein a content class in the directory schema defines the status-
3 monitoring object.

5 51. (Original) A computing device as recited in claim 37, wherein the
6 computer-executable instructions further comprises instructions for:

7 monitoring a status corresponding to an operation of the workflow;
8 determining that the status comprises a failure status;
9 responsive to the determining, taking a corrective action to advance the
10 workflow in view of the failure status; and

11 wherein a content class in the directory schema defines the status-
12 monitoring object.

14 52. (Original) A computing device as recited in claim 37, wherein the
15 instructions for executing the tasks further comprise instructions for:

16 updating a status corresponding to a task in the workflow; and
17 responsive to the updating, evaluating the workflow to determine that a
18 next task of the tasks to be implemented.

20 53. (Original) A computing device as recited in claim 37, wherein the
21 tasks represent an inverse set of tasks that were previously performed as part of a
22 different workflow.

24 54. (Original) A computing device as recited in claim 37, wherein the
25 tasks implement a policy with respect to one or more directory resources, and

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1 wherein the instructions for mapping the state change to the object further
2 comprises instructions for automatically determining the workflow based on the
3 policy.

4
5 55. (Original) A computing device comprising processing means for:
6 detecting a state change to an object in a directory; and
7 responsive to detecting the state change:
8 mapping the state change to the object to a workflow comprising a set of
9 tasks; and
10 executing the tasks to achieve a desired state in the directory.

11
12 56. (Original) A computing device as recited in claim 55, wherein the
13 means for executing the tasks further comprise means for storing the desired state.

14
15 57. (Original) A computing device as recited in claim 55, wherein the
16 means for executing the tasks further comprise means for continuously executing
17 an operation of a task of the tasks until convergence of the desired state is
18 identified.

19
20 58. (Original) A computing device as recited in claim 55, wherein the
21 means for executing the tasks further comprise means for storing a sequence of
22 operations based on the tasks.

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1 59. (Original) A computing device as recited in claim 55, wherein
2 means for executing the tasks further comprise means for storing information
3 corresponding to one or more directory objects to which the workflow applies.
4

5 60. (Original) A computing device as recited in claim 55, wherein the
6 means for executing the tasks further comprise means for storing status
7 information based on respective status of at least one subset of the tasks.
8

9 61. (Original) A computing device as recited in claim 55, wherein the
10 means for mapping the state change to the object further comprise means for
11 evaluating the state change to the object based on a declarative condition stored as
12 a text string on an object instance of a content class defined by the directory
13 schema.
14

15 62. (Original) A computing device as recited in claim 55, wherein a task
16 of the tasks comprises any combination of one or more declarative conditions and
17 one or more operations represented by a text string stored on an object instance of
18 a content class defined by the directory schema.
19

20 63. (Original) A computing device as recited in claim 55, wherein
21 semantics of the workflow are based on a workflow schema.
22

23 64. (Original) A computing device as recited in claim 55, wherein the
24 means for mapping the state change to the object, semantics of the mapping are
25 based on an event association object schema.

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65. (Original) A computing device as recited in claim 55, wherein the means for executing the tasks, at least one subset of the tasks are executed with respect to one another based on an order of execution relationship comprising a finish-start relationship, a parallel execution relationship, a precedence constraint relationship, or a task priority relationship.

66. (Original) A computing device as recited in claim 55, wherein the means for executing the tasks, at least one subset of the tasks are executed with respect to one another based on a precedence constraint relationship or a task priority relationship.

67. (Original) A computing device as recited in claim 55, further comprising processing means for:

monitoring a status corresponding to a task of the tasks;

storing the status on a status monitoring object; and

wherein a content class in the directory schema defines the status-monitoring object.

68. (Original) A computing device as recited in claim 55, further comprising processing means for:

monitoring a set of directory resources affected by the workflow;

storing the directory resources on a status monitoring object; and

wherein a content class in the directory schema defines the status-monitoring object.

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69. (Original) A computing device as recited in claim 55, further comprising processing means for:

monitoring a status corresponding to an operation of the workflow;

determining that the status comprises a failure status;

responsive to the determining, taking a corrective action to advance the workflow in view of the failure status; and

wherein a content class in the directory schema defines the status-monitoring object.

70. (Original) A computing device as recited in claim 55, wherein the means for executing the tasks further comprise means for:

updating a status corresponding to a task in the workflow; and

responsive to the updating, evaluating the workflow to determine that a next task of the tasks to be implemented.

71. (Original) A computing device as recited in claim 55, wherein the tasks represent an inverse set of tasks that were previously performed as part of a different workflow.

72. (Original) A computing device as recited in claim 55, wherein the tasks implement a policy with respect to one or more directory resources, and wherein the means for mapping the state change to the object further comprise means for automatically determining the workflow based on the policy.

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73. (Previously presented) A workflow enabled directory schema comprising a plurality of base object content classes, the workflow enabled directory schema:

a provisioning service content class to detect an event corresponding to a state change in a directory object;

a workflow content class for storing a sequence of tasks;

an event association content class for storing declarative conditions to map the state change to the directory object to an object instance of the workflow content class; and

wherein the provisioning service content class is further configured to execute the sequence of tasks corresponding to the object instance.

74. (Original) A workflow enabled directory schema as recited in claim 73, wherein at least a subset of the base object content classes comprise a respective flexible attribute data field that indicates a data type, the data type being used to express various operational or data providing properties of the flexible attribute, the various operational or data providing properties being independent of the data type and independent of any modification to the workflow enabled directory schema.

75. (Original) A workflow enabled directory schema as recited in claim 73, wherein the sequence of tasks comprises any combination of a declarative conditions and operations corresponding to directory-based objects.

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1 76. (Original) A workflow enabled directory schema as recited by claim
2 73, further comprising a status monitoring content class for storing a status of an
3 object instance of the workflow content class.

4
5 77. (Original) A computer-readable medium comprising a workflow
6 enabled directory schema as recited in claim 73.

7
8 78. (Original) A computer comprising a computer-readable medium
9 comprising a workflow enabled directory schema as recited in claim 73.